

Smart Materials Technology for High Speed Adaptive Inlet/Nozzle Design, Phase II

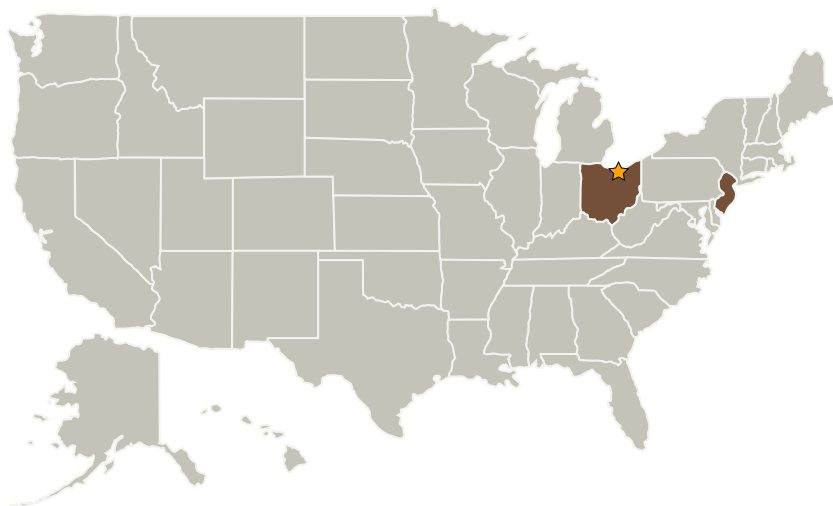
Completed Technology Project (2004 - 2006)



Project Introduction

Enabling a new generation of high-speed civil aircraft will require breakthrough developments in propulsion systems, including novel techniques to optimize inlet performance in multiple operating conditions. Maximizing propulsive performance while minimizing weight and mechanical complexity is a key goal, and rapidly maturing smart materials technology can enable adaptive control of inlet geometry to allow in-flight optimization of engine flows. Phase I of this effort built on established device technology using high strength Shape Memory Alloy (SMA) actuators and initiated development of adaptive inlet concepts for application to Supersonic Business Jets (SSBJs). Leveraging this work as well as prior efforts in SMA device design and testing has permitted the first steps in the development a family of actuation and flow control devices for use in flight applications. Phase II will build on this work with mutually supporting design, analysis, and test activities including: detailed definition of the effectiveness of geometry adaptation in improving installed engine performance at low and high speeds; construction and test of a benchtop adaptive inlet component demonstrator using high temperature SMA alloy actuators; high-speed wind tunnel testing of sectional components with realistic thermal and aerodynamic loads; and construction of a model 3D adaptive inlet.

Primary U.S. Work Locations and Key Partners



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Table of Contents

Project Introduction	1
Primary U.S. Work Locations and Key Partners	1
Organizational Responsibility	1
Project Management	2
Technology Areas	2

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Glenn Research Center (GRC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★ Glenn Research Center(GRC)	Lead Organization	NASA Center	Cleveland, Ohio
Continuum Dynamics, Inc.	Supporting Organization	Industry	Ewing, New Jersey

Primary U.S. Work Locations	
New Jersey	Ohio

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Technology Areas

Primary:

- TX15 Flight Vehicle Systems
 - └ TX15.1 Aerosciences
 - └ TX15.1.5 Propulsion Flowpath and Interactions